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(54) **LAMP-INDEPENDENT ADJUSTABLE
RECESSED LIGHT FIXTURE**

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362/429

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287, 362, 364, 368, 370, 382, 418, 419;
248/324, 279.1, 317, 323, 200, 274.1, 276.1,
278.1

(56) **References Cited**

U.S. PATENT DOCUMENTS

2,069,950 A * 2/1937 Greppin 362/285

2,716,185 A * 8/1955 Burluik et al. 362/364
3,360,642 A * 12/1967 De Vos et al. 362/285
4,232,361 A * 11/1980 Kelsall 362/285
5,630,663 A * 5/1997 Ling et al. 362/365
5,823,664 A * 10/1998 Demshki et al. 362/427
5,908,236 A * 6/1999 Lueken et al. 362/364
6,036,337 A * 3/2000 Belfer 362/285
6,402,112 B1 * 6/2002 Thomas et al. 248/317

* cited by examiner

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(57) **ABSTRACT**

An adjustable light fixture includes a fixture assembly, a rotation adjustment assembly, and an angle adjustment assembly. The rotation adjustment assembly is configured to receive a lamp, orient the lamp relative to the fixture assembly, and maintain the orientation of the lamp relative to the fixture assembly when the lamp is removed and replaced. The angle adjustment assembly is movably connected to the fixture assembly and is configured to adjust the angle between the fixture assembly and the rotation adjustment assembly. A method of relamping an adjustable light fixture includes providing an adjustable light fixture, installing a lamp in the rotation adjustment assembly from above or below the adjustable light fixture, and adjusting the rotational or angular orientation of the fixture.

27 Claims, 8 Drawing Sheets

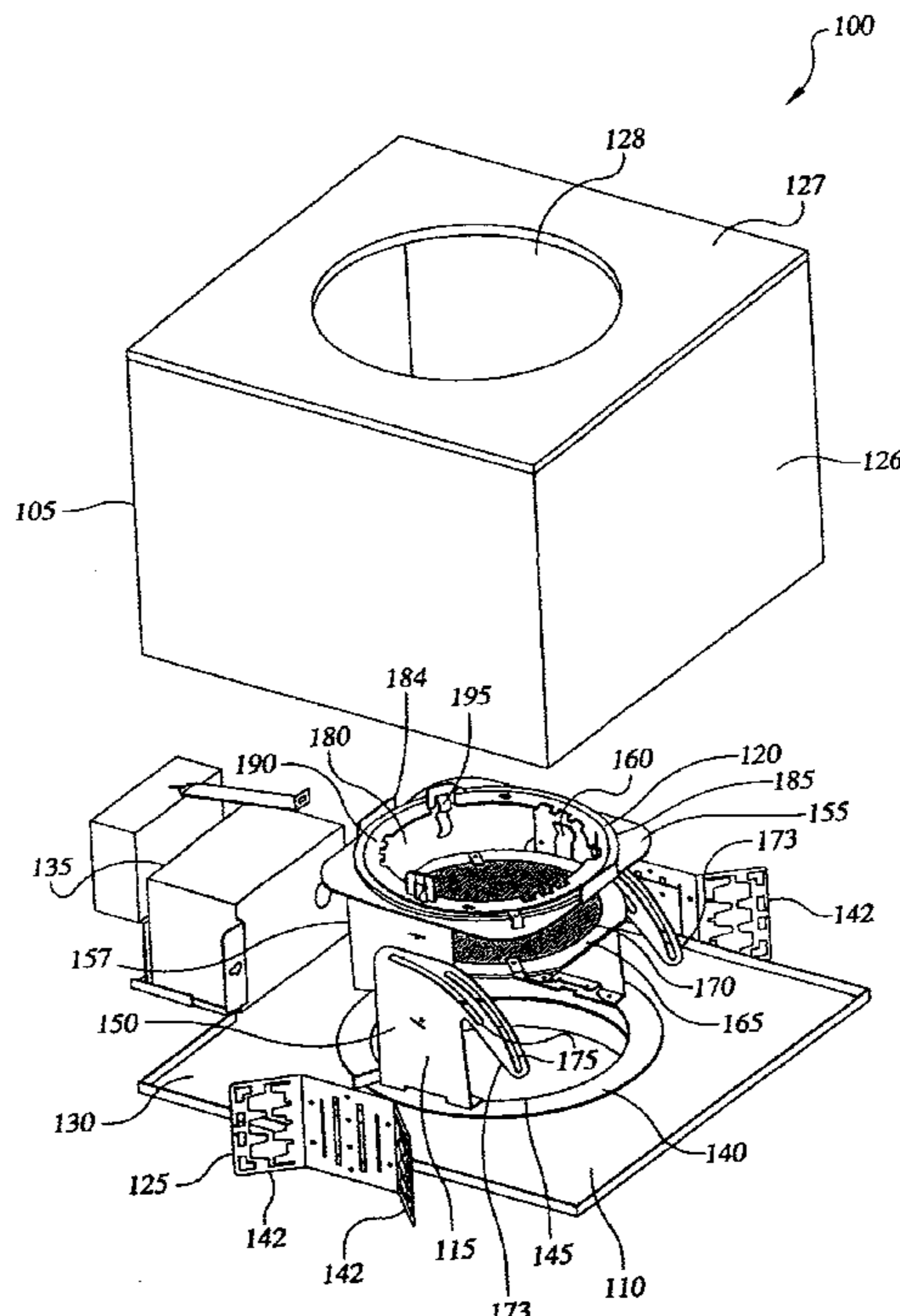
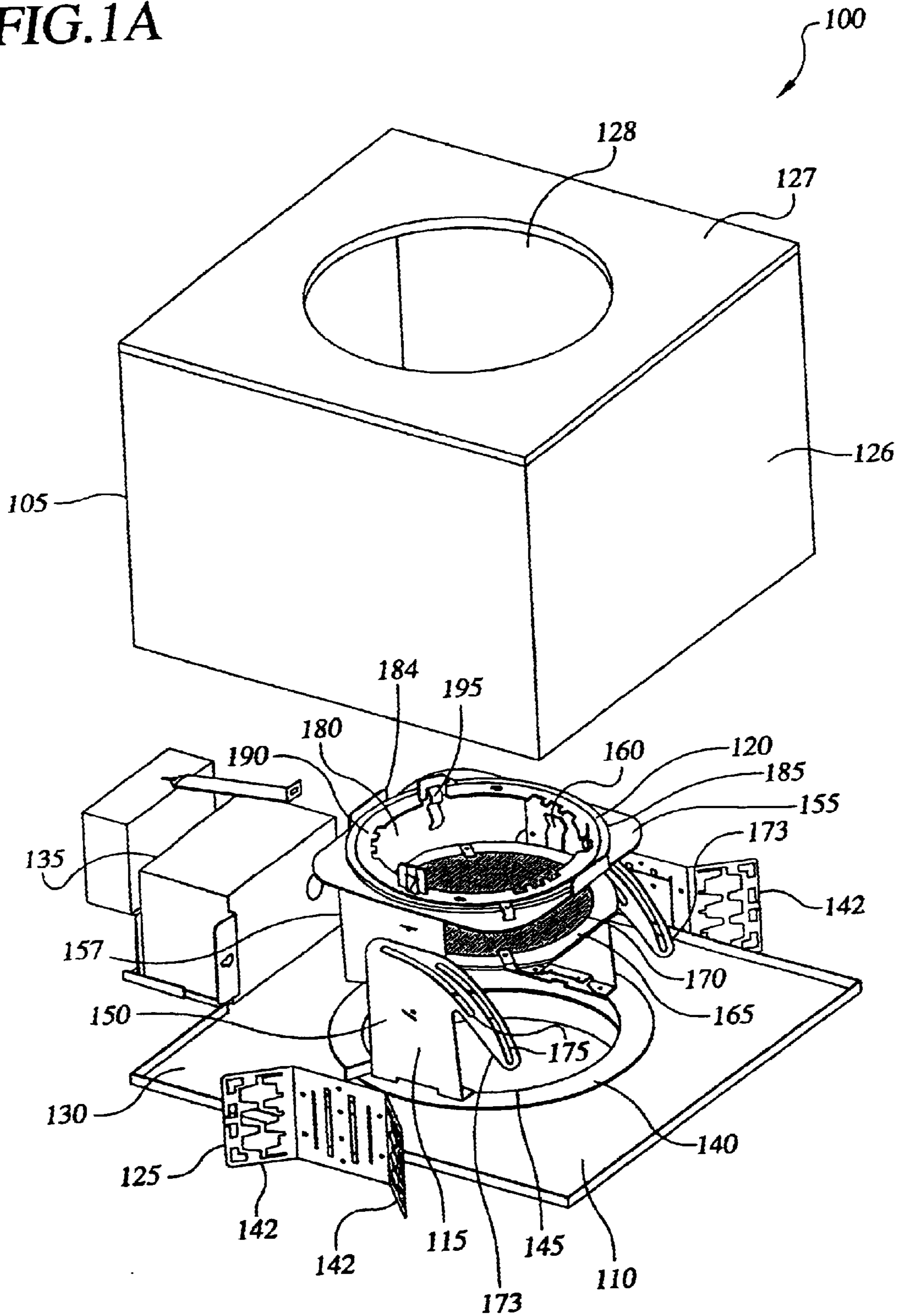


FIG. 1A



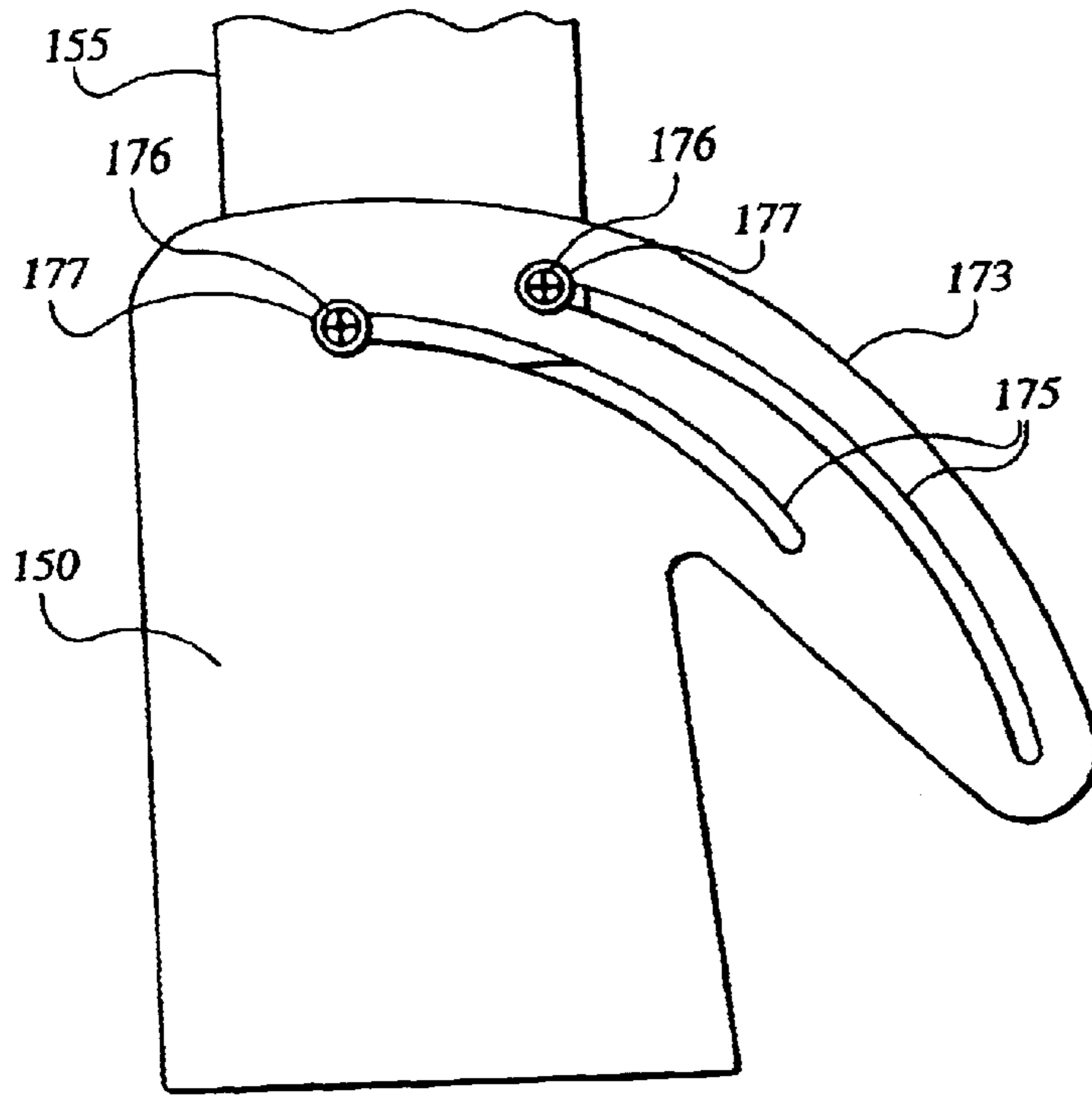


FIG. 1B

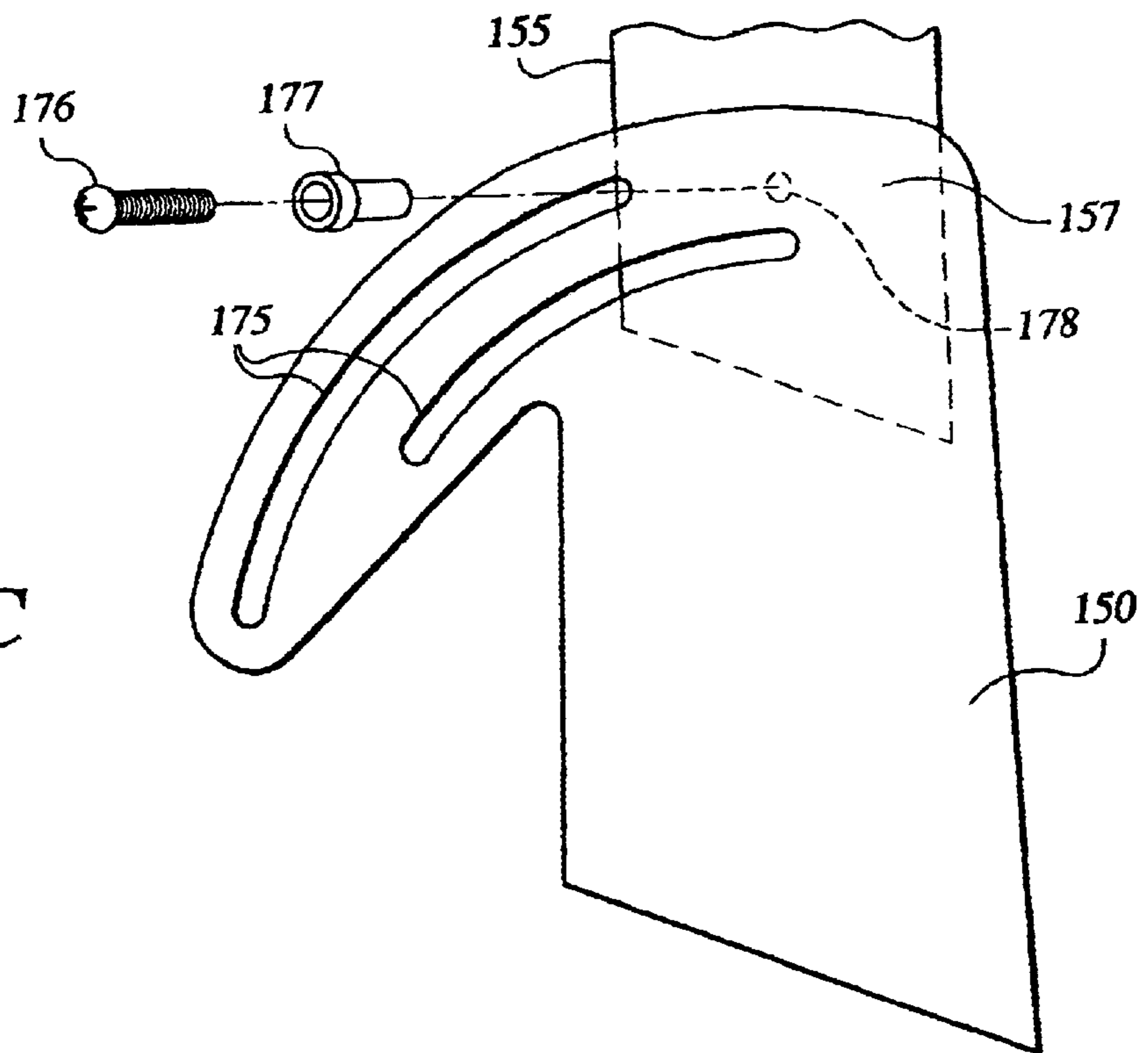


FIG. 1C

FIG. 1D

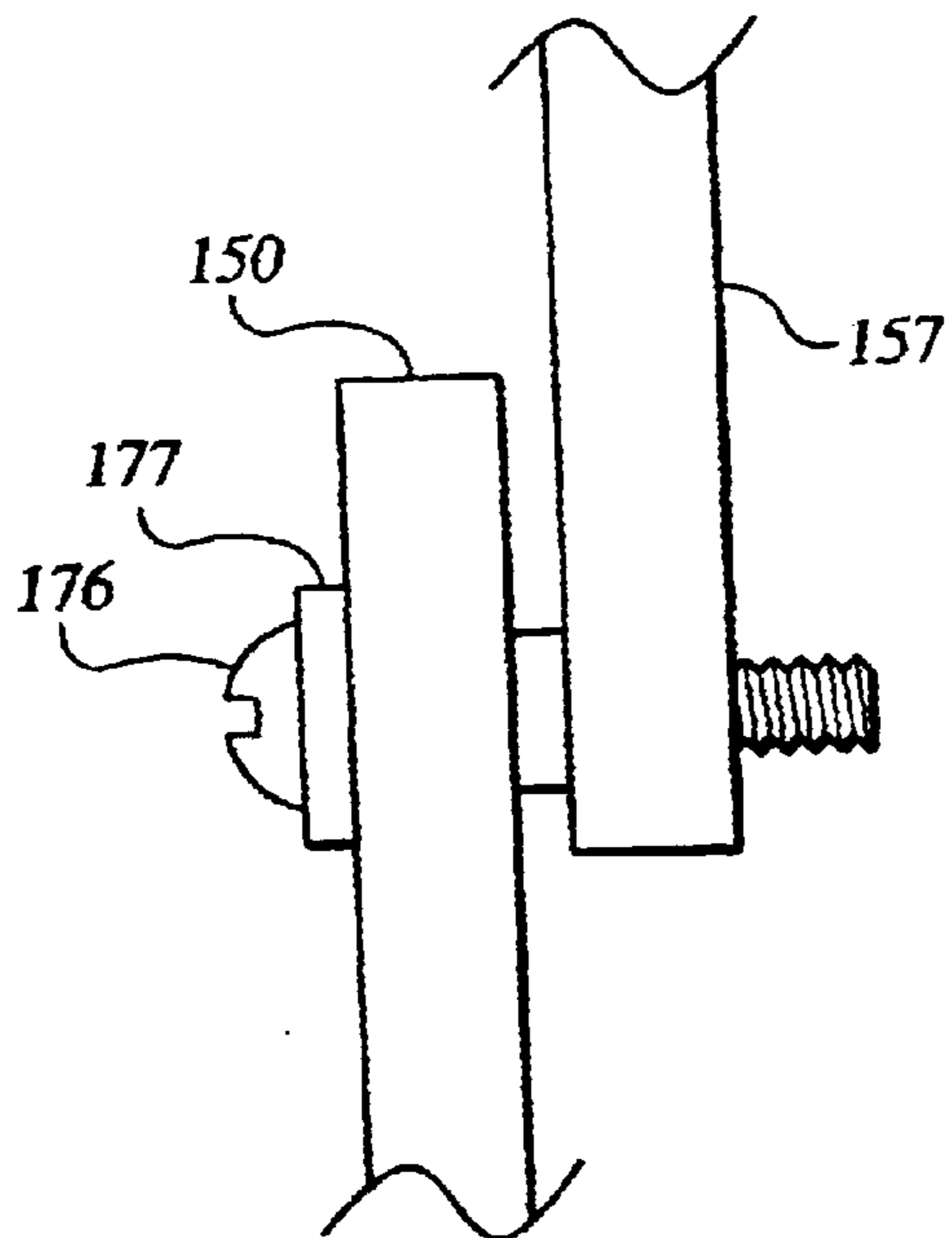
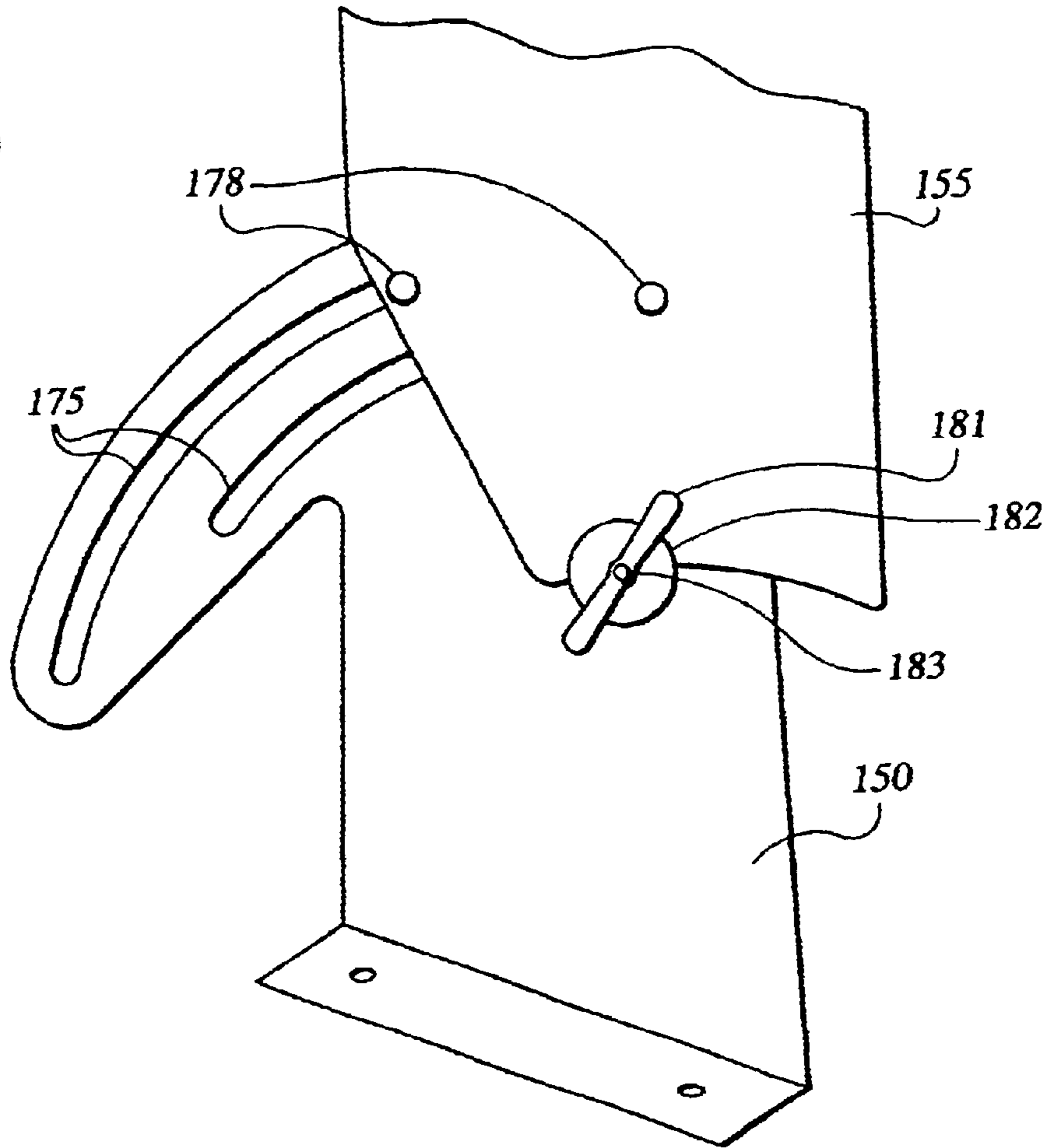


FIG. 1E

FIG. 2A

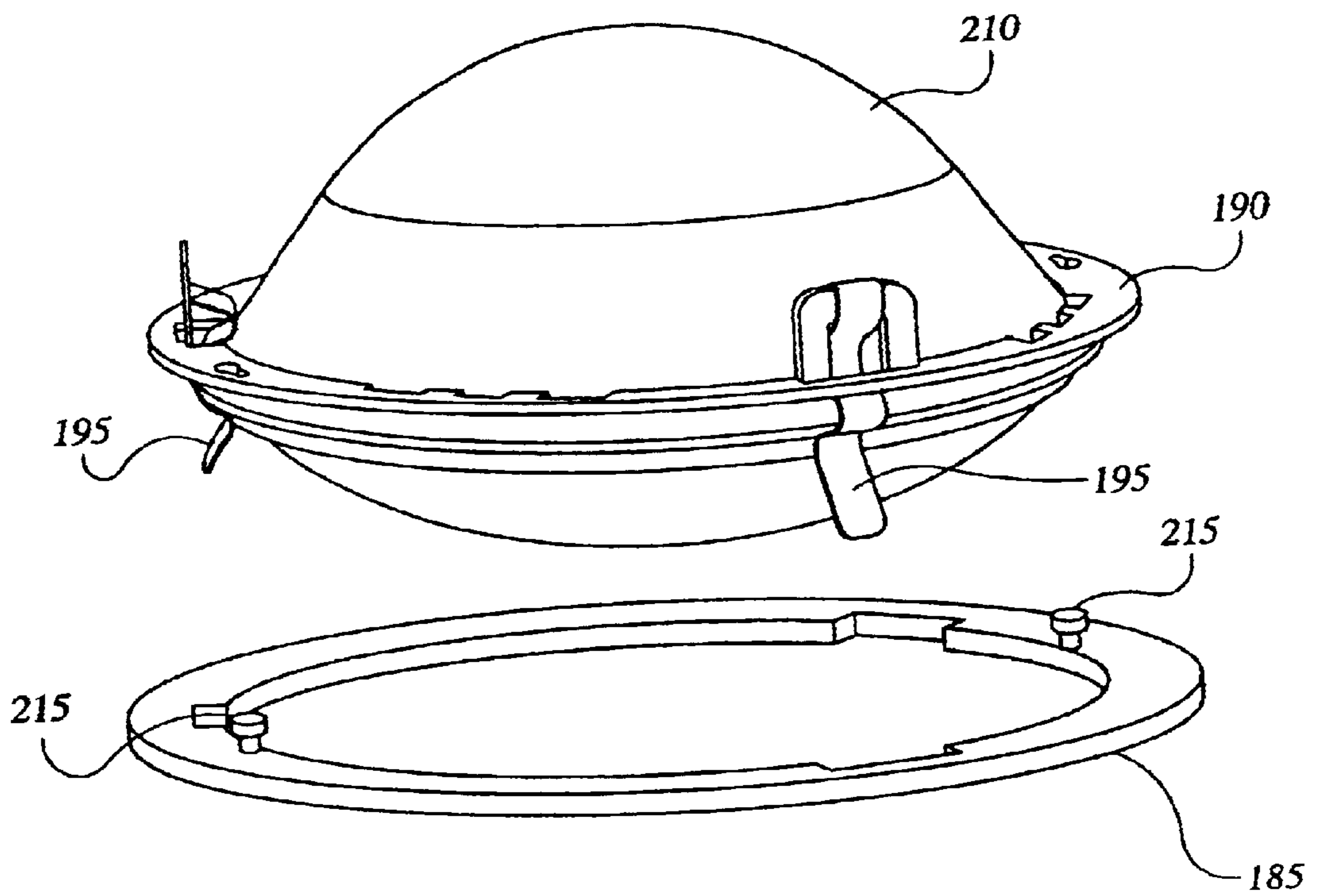


FIG.2B

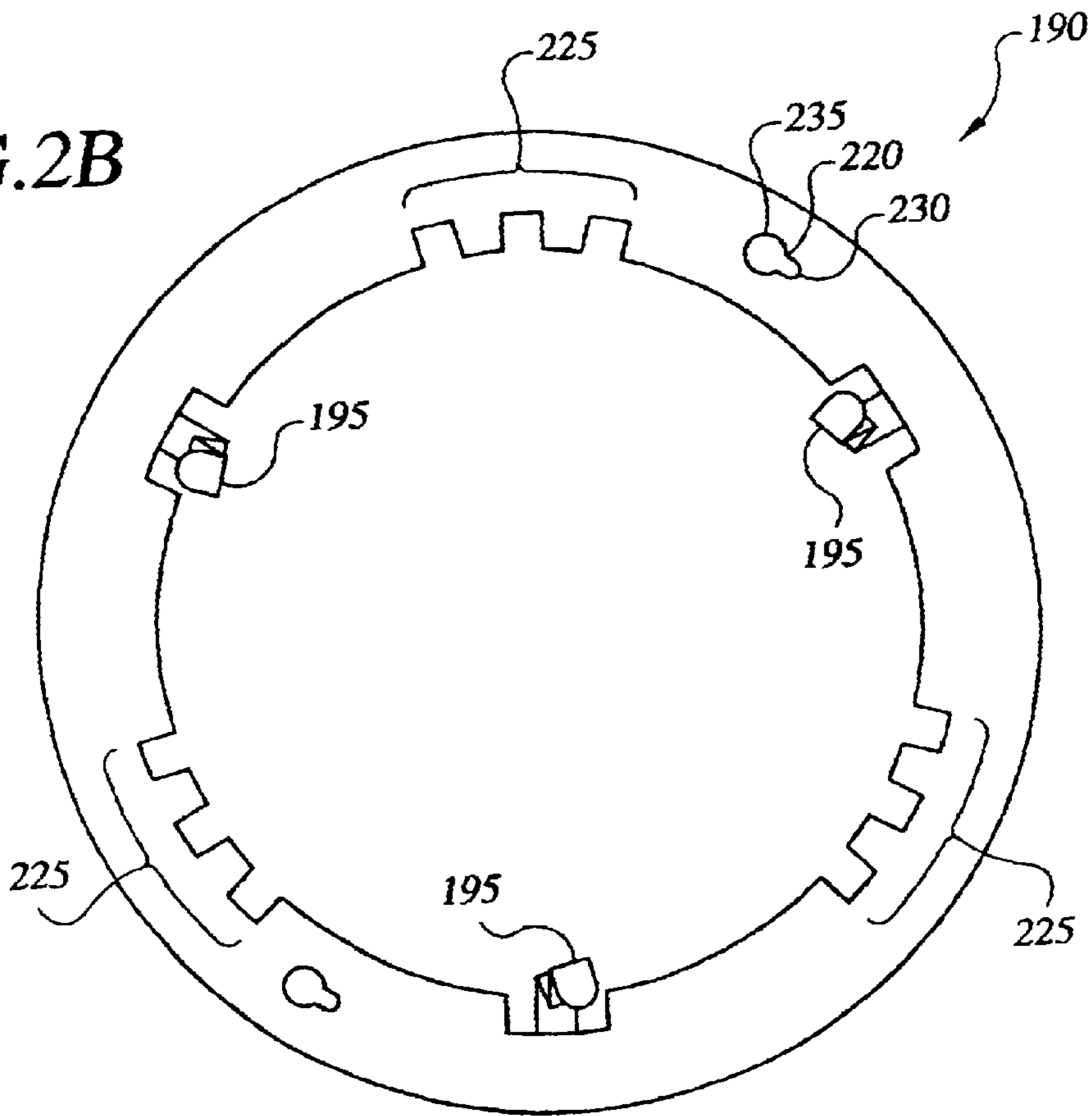


FIG.2C

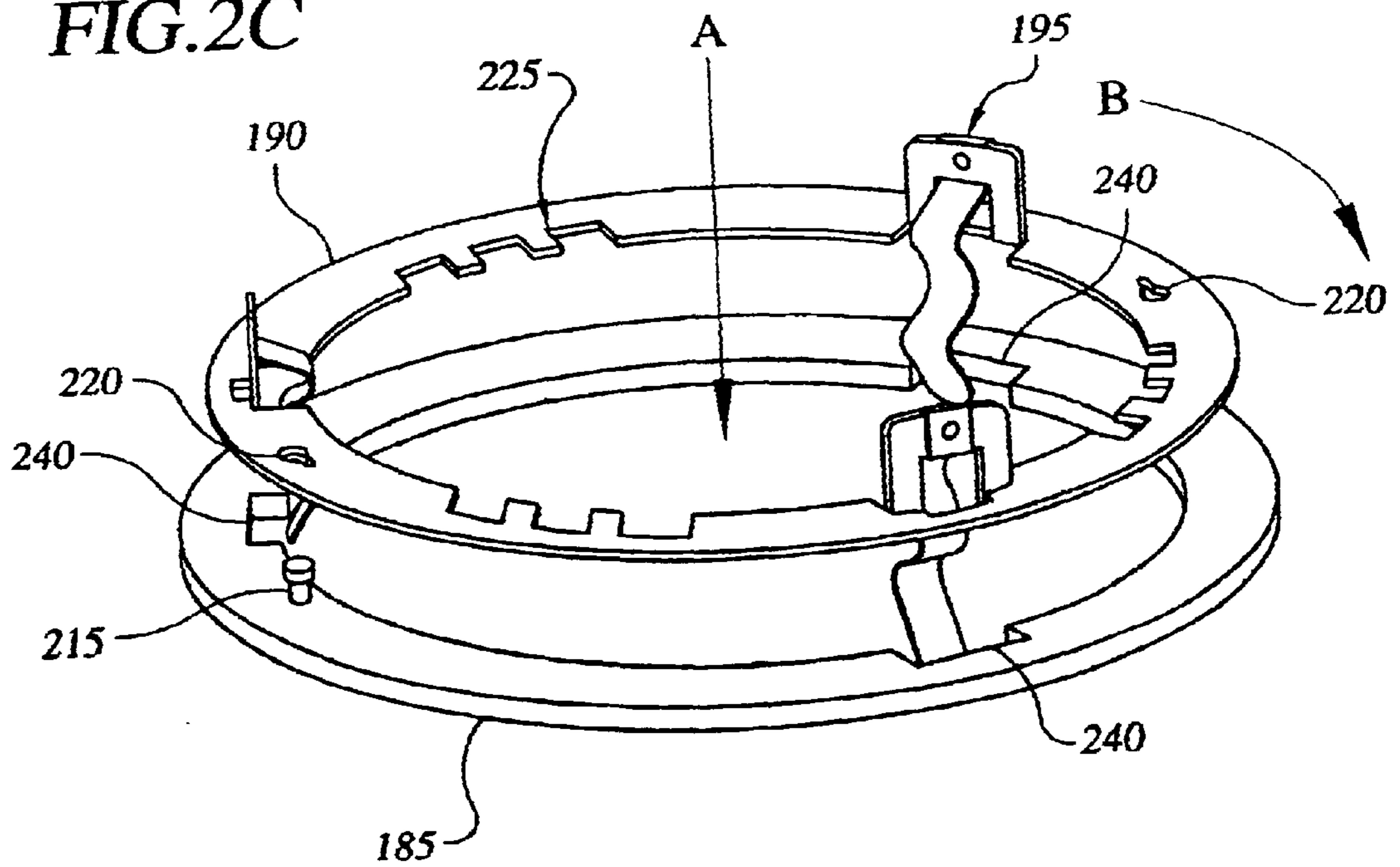


FIG.3A

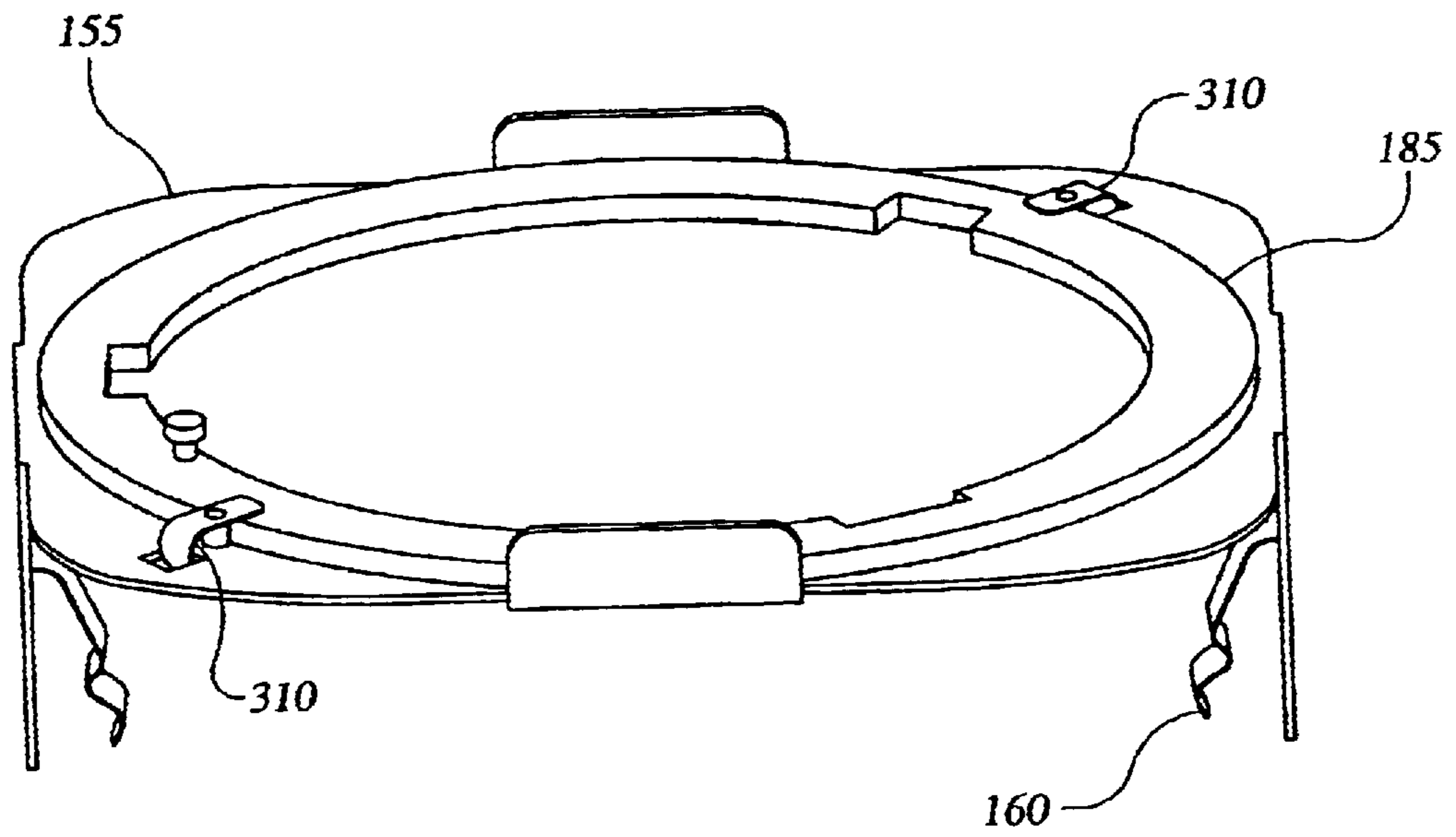


FIG.3B

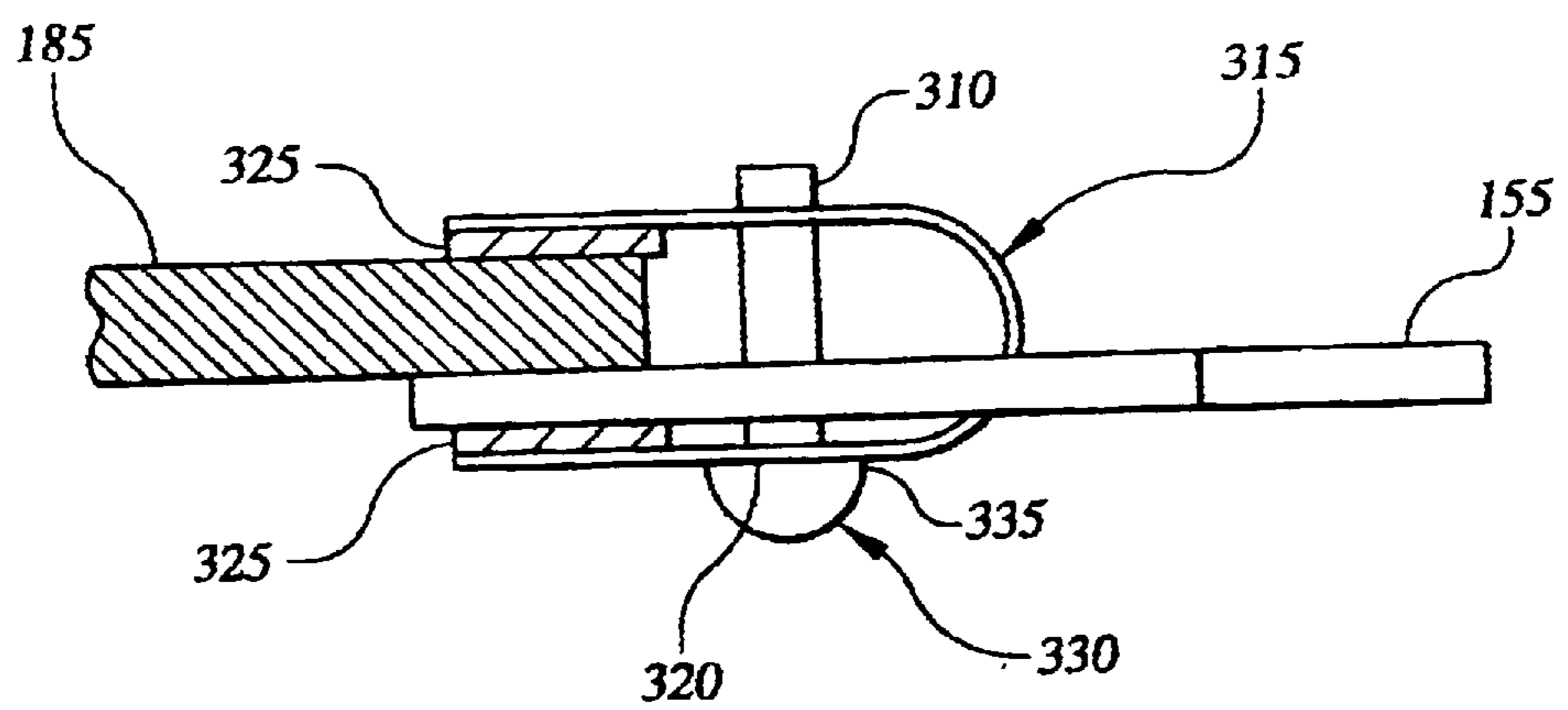


FIG. 4A

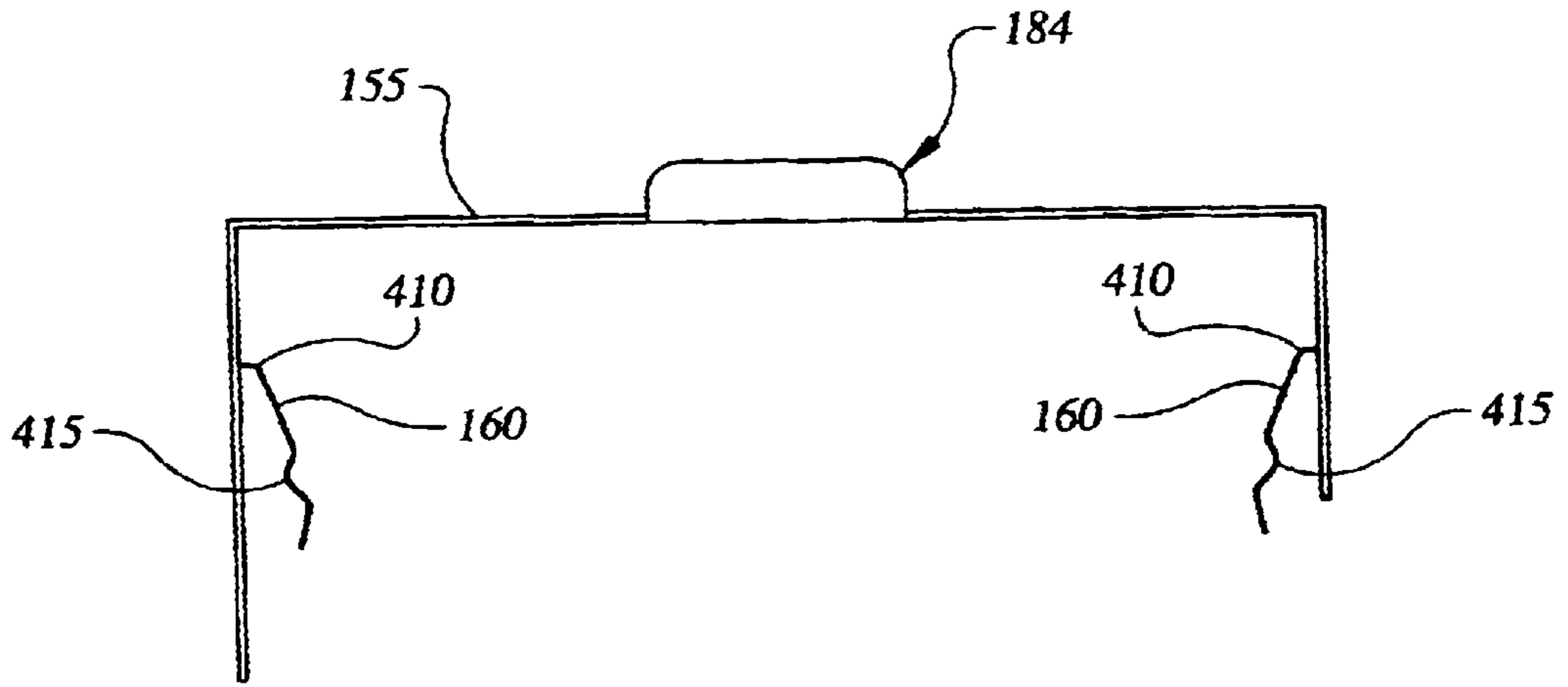


FIG. 4B

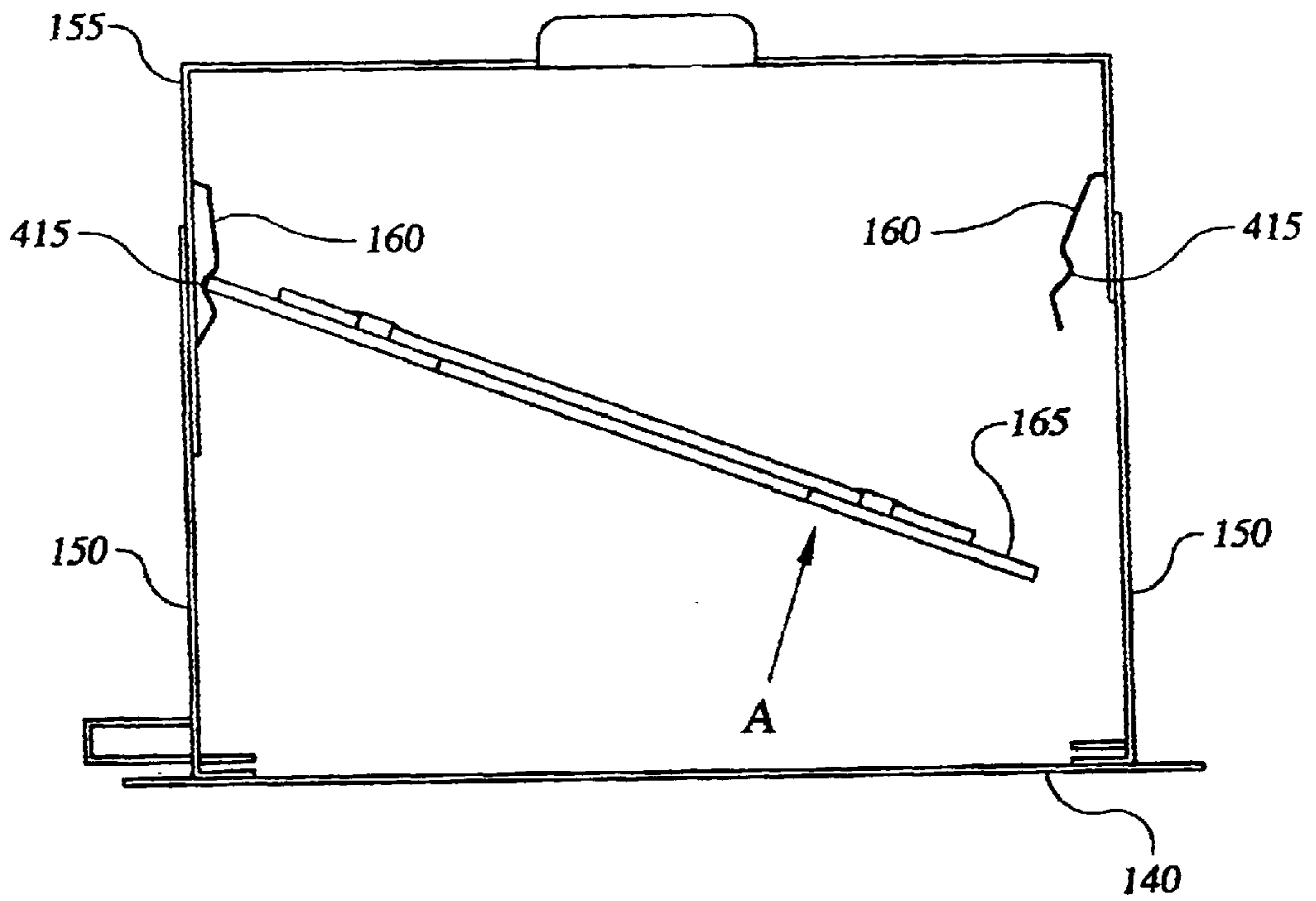


FIG. 5A

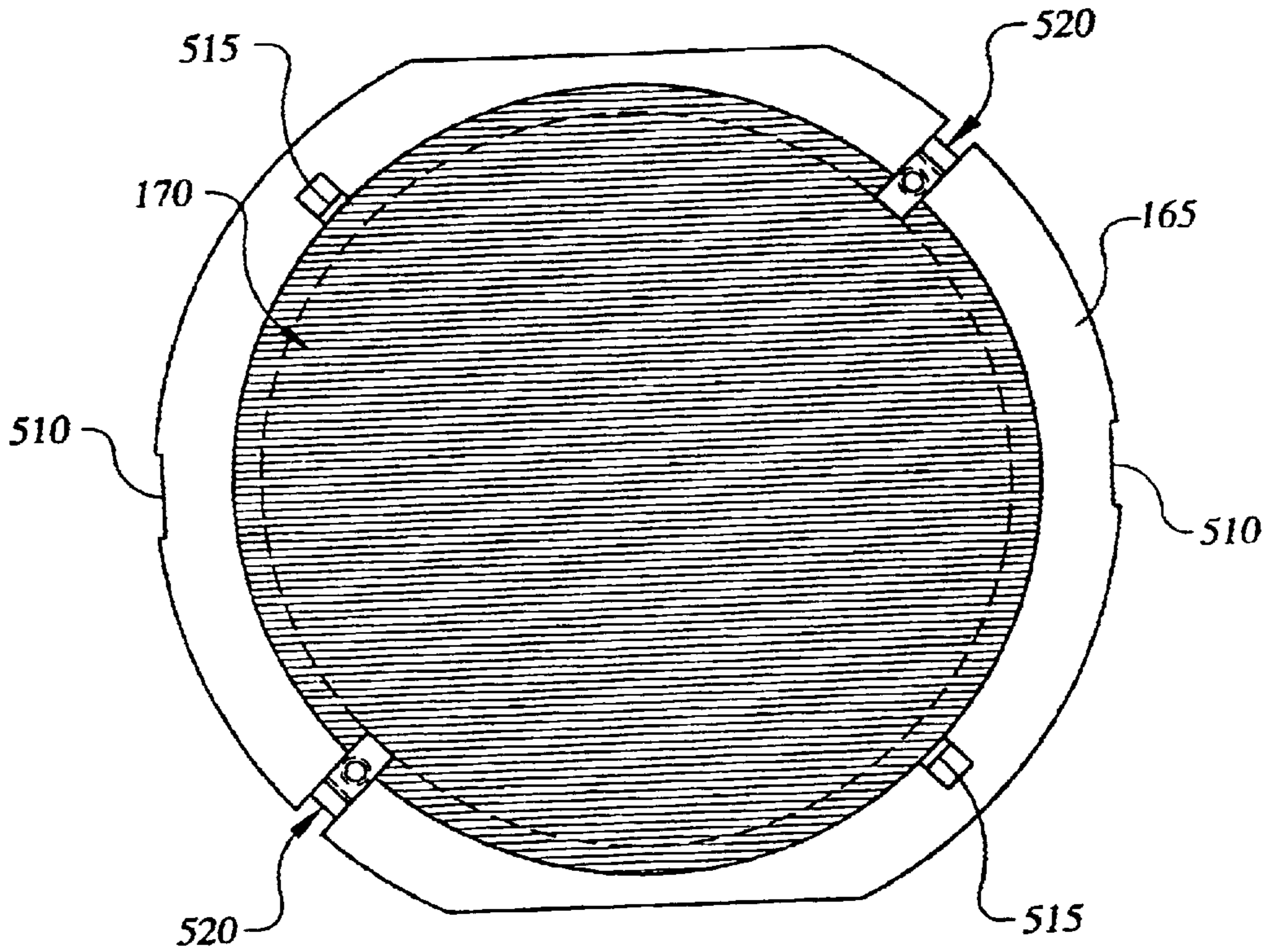
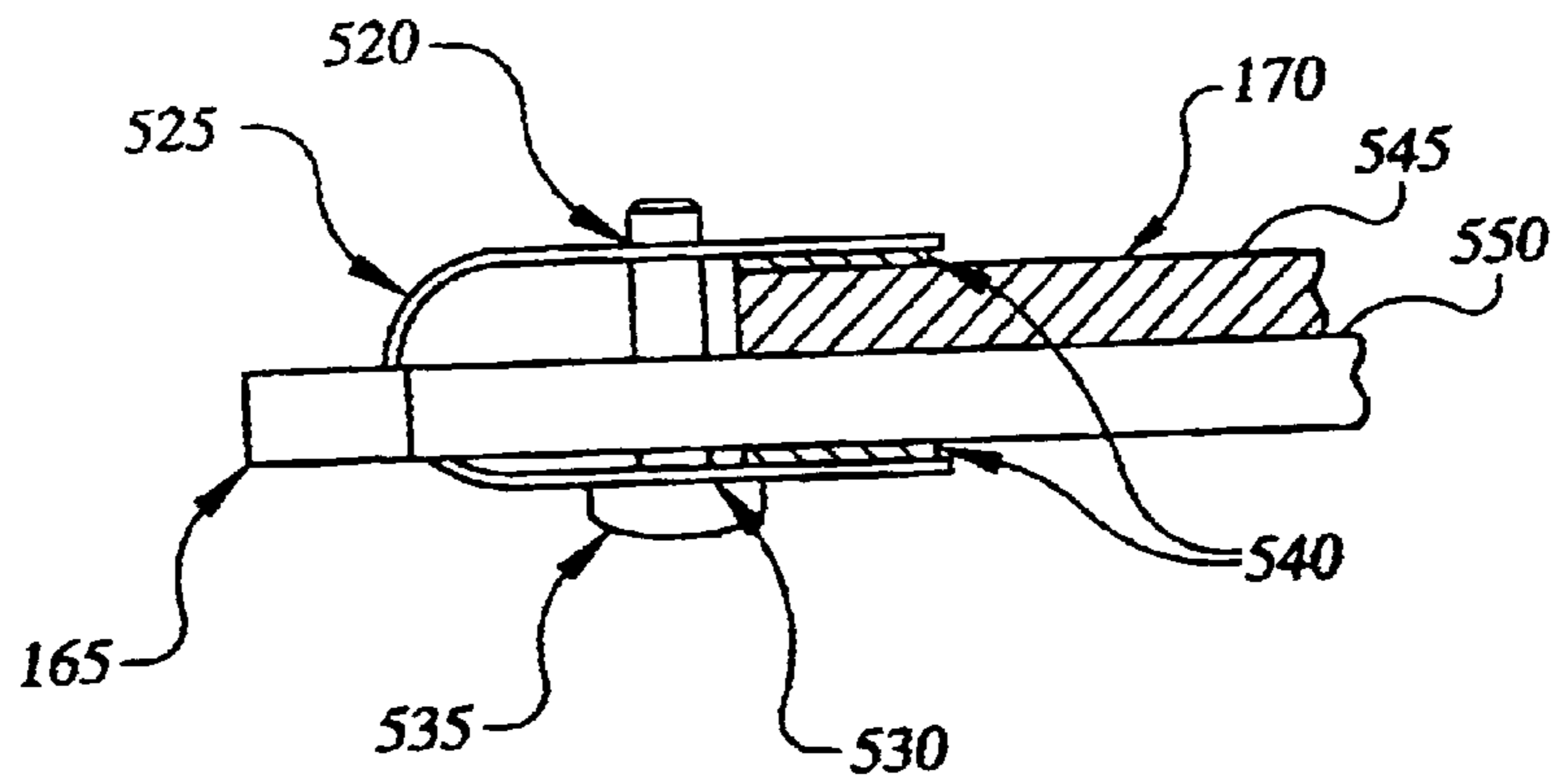


FIG. 5B



LAMP-INDEPENDENT ADJUSTABLE RECESSED LIGHT FIXTURE

TECHNICAL FIELD

This invention relates to light fixtures, and more particularly to a light fixture that has relamping and adjustment locks to maintain the angular and rotation orientation of a lamp during relamping.

BACKGROUND

Recessed light fixtures typically include a plaster frame, a can, a lamp holder, and a trim ring that encircles an opening of the can. Recessed light fixtures also may be designed with adjustment features such as a partially closable trim ring and a pivot mechanism to direct the light beam from the enclosed lamp to illuminate a specific area within a room. A light fixture may have the adjustment features set at installation and then may be recessed by mounting the fixture in a ceiling or a wall. Adjustment and maintenance of the recessed light fixture, however, may require access to the light fixture through the ceiling or the wall after it is installed, which can be troublesome and time consuming.

SUMMARY

In one general aspect, a light fixture includes a fixture assembly, a rotation adjustment assembly, and an angle adjustment assembly. The rotation adjustment assembly is configured to receive a lamp, orient the lamp relative to the fixture assembly, and maintain the orientation of the lamp relative to the fixture assembly when the lamp is removed and replaced. The angle adjustment assembly is movably connected to the fixture assembly and is configured to adjust the angle between the fixture assembly and the rotation adjustment assembly.

Implementations of the adjustable light fixture may include one or more of the following features. For example, the rotation adjustment assembly may include a lamp frame, a rotation disc that is rotatably mounted to the lamp frame, and a rotation frame that receives the lamp and is mounted to the rotation disc. One or more clips may be used to fixedly attach the rotation disc to the lamp frame. One or more screws may be threadably inserted into threaded openings in the rotation disc, and may be further received in openings in the rotation frame.

The screws include a first portion having a first screw diameter and a second portion having a larger screw diameter. The openings in the rotation frame may include a first portion having a first opening diameter and a second portion having a second, smaller opening diameter. In this implementation, the second screw diameter is smaller than the first opening diameter in the opening and larger than the second opening diameter in the opening, such that the screw retains the rotation disc to the rotation frame when the screw is positioned in the second portion of the opening.

Clips may be mounted to the rotation adjustment assembly to removably retain a lamp to the rotation adjustment assembly. The clips also may be mounted to the rotation frame.

The rotation frame may include an opening having one or more sets of notches configured to mate with protruding tabs on a lamp.

The angle adjustment assembly may include a fastener and one or more downwardly projecting arms. The downwardly projecting arms rotatably connect to one or more

arms extending from the fixture assembly. The fastener fixes the position of one of the downwardly projecting arms relative to the mating arm that extends from the fixture. The downwardly projecting arms may be connected to the rotation adjustment assembly. One or more of the arms extending from the fixture assembly may include an arc portion having at least one slot and one or more of the downwardly projecting arms may include extending members that mate with the slot. When the downwardly projecting arms are moved relative to the arms extending from the fixture assembly, the extending members slidably move within the slots to set an angle of the arms relative to the downwardly projecting arms.

The fastener may be configured to fix the position of an arm extending from the fixture assembly relative to a downwardly projecting arm.

The adjustable light fixture also may have a lens mounting assembly with a lens that is removably mounted to the rotation adjustment assembly. The lens mounting assembly is configured to maintain a constant angular relationship between a lamp mounted in the rotation adjustment assembly and the lens. The lens mounting assembly also is configured such that it can be removed and replaced without affecting the angular relationship between the lamp and the lens.

The lens mounting assembly also may include a lens holder and one or more lens clips. The lens holder retains the lens and includes one or more mounting members. The lens clips mate with the mounting members to retain the lens holder. The lens clips may be mounted to the rotation adjustment assembly and the mounting members may be notches in the lens holder.

The lens holder may be configured to maintain a constant orientation between the lens and the lamp. This feature allows the lens mounting assembly to be removed and replaced without affecting the orientation between the lens and the lamp. One or more clips may be used to fixedly attach the lens to the lens holder.

The lens may have one or more ribbed surfaces and the lens mounting assembly may maintain a constant orientational relationship between the ribbed surface of the lens and the lamp. Moreover, the lens mounting assembly may be removed and replaced without affecting the orientation between the ribbed surface of the lens and the lamp.

In another general aspect, an adjustable light fixture may be relamped by removing a lamp from a rotation adjustment assembly and reinstalling a lamp in the rotation adjustment assembly. The light fixture may include one or more of the features described above. The light fixture also may include one or more of the following features. For example, the rotation adjustment assembly may be configured to receive a lamp, orient the lamp relative to the fixture assembly, and maintain the orientation of the lamp relative to the fixture assembly when the lamp is removed and replaced. The angle adjustment assembly may be moveably connected to the fixture assembly and adjustable to set an angle between the fixture assembly and the rotation adjustment assembly, and may be configured to be adjusted to set an angle between the fixture assembly and the rotation adjustment assembly.

Removing the lamp may include removing the lamp from above the rotation adjustment assembly by loosening screws attaching a rotation frame to a rotation disc and lifting the rotation frame and the lamp away from the angle adjustment assembly. Reinstalling the lamp may include reinstalling the lamp from above the rotation adjustment assembly by aligning the rotation frame holding the lamp with the rotation disc

and tightening the screws to attach the rotation frame and the lamp to the rotation disc.

Removing the lamp may include removing the lamp from below the rotation adjustment assembly by pulling the lamp from clips attaching the lamp to the rotation adjustment assembly. Reinstalling the lamp may include reinstalling the lamp from below the rotation adjustment assembly by pushing the lamp into the clips attaching the lamp to the rotation adjustment assembly.

The relamping may further include removing a lens mounting assembly prior to removing the lamp and reinstalling the lens mounting assembly after reinstalling a lamp. The method also may include adjusting a rotational orientation of the lamp relative to the fixture assembly by adjusting the rotation adjustment assembly. Adjusting the rotation adjustment assembly may include mounting the rotation frame to the rotation disc, rotating the rotation disc relative to the lamp frame until a desired rotational orientation is attained, and attaching one or more clips to the rotation disc to fixedly attach the rotation disc to the lamp frame at the desired rotational orientation.

A lamp may be mounted to the rotation frame by inserting the lamp between the clips to retain the lamp with notches of the rotation frame mated with protruding tabs on the lamp. The lamp may be removed from below the light fixture by removing the lamp from the clips.

The lamp may be removed from above the light fixture, such as, for example, from a position above the light fixture in the ceiling plenum. Removing the lamp from above the adjustable light fixture includes rotating the rotation frame relative to the rotation disc until screws in the rotation disc are positioned in the first portion of the openings in the rotation frame, lifting the rotation frame, and removing the lamp from the clips holding the lamp to the rotation frame.

The angle adjustment assembly may be adjusted to set an angle between the fixture assembly and the rotation adjustment assembly. Adjusting the angle adjustment assembly includes moving downwardly projecting arms relative to arms extending from the fixture assembly, slidably moving an extending member within a slot to set an angle of the arm relative to the downwardly projecting arm to set an angle between the fixture assembly and the rotation adjustment assembly, and using a fastener to fix the position of the projecting arm.

The adjustable light fixture is adjustable for a wide range of applications by adjustment of the angular or rotational orientation. After the fixture is fixed in a particular orientation, the fixture may be relamped without changing either the angular or rotational orientation. Relamping may be accomplished by access to the fixture from above the ceiling, such as, for example, in the ceiling plenum, or from below the fixture. These characteristics provide considerable advantage to the recessed light fixture. For example, after a desired illumination configuration has been set between the lamp and the lens by adjusting their angular and rotational orientations, there are great time-savings achieved if the lamp can be easily and quickly replaced without altering the illumination configuration. This light fixture is configured to provide such a relamping.

The details of one or more implementations are set forth in the accompanying drawings and the description below. Other features and advantages will be apparent from the description, the drawings, and the claims.

DESCRIPTION OF DRAWINGS

FIG. 1A shows a recessed light fixture.

FIGS. 1B–1E show an angle adjustment mechanism for orienting a lens and a lamp in the recessed light fixture of FIG. 1A.

FIGS. 2A–2C show a lamp rotation assembly for use in a recessed light fixture.

FIGS. 3A and 3B show a lamp frame of the recessed light fixture mounted to a rotation disc with mounting clips.

FIGS. 4A and 4B show a lens holder for the recessed light fixture attached to a lamp frame with lens clips.

FIGS. 5A and 5B show a lens holder for the recessed light fixture with a lens installed using lens clips.

Like reference symbols in the various drawings indicate like elements.

DETAILED DESCRIPTION

Referring to FIG. 1A, an adjustable recessed light fixture **100** includes a housing **105**, a fixture assembly **110**, an angle adjustment assembly **115**, and a rotation assembly **120**. The angle adjustment assembly **115** provides a mechanism to adjust the angle of a beam of light projecting from a lamp attached to the light fixture. The rotation assembly **120** provides a mechanism to adjust the rotational orientation of the light beam around the angle at which the light beam projects from the lamp. In this regard, a lamp with a non-uniform light pattern can be rotationally oriented in order to attain a desired illumination effect. The angle adjustment assembly **115** and the rotation assembly **120** also are configured such that the lamp and a lens can be removed and a new lamp installed without affecting the angle or the rotational orientation of the lamp and the lens.

The housing mounts to the fixture assembly **110** and encloses the angle adjustment assembly **115**, the rotation assembly **120**, and a lamp (not shown). Although the housing **105** is illustrated in FIG. 1A as having sides **126** and a top **127** with a circular opening **128**, the housing can be configured in any shape that partially or completely encloses the angle adjustment assembly **115** and the rotation assembly **120**.

The fixture assembly **110** includes two hanger brackets **125**, a plaster frame **130**, a junction box **135**, and a mounting disc **140**. The hanger bracket **125** is a rectangular bracket that includes two bent portions **142** for mounting to ceiling plenums and surfaces of various sizes. The hanger bracket **125** also has multiple cut-outs of different shapes and sizes for mounting with hardware of various sizes. The hanger brackets **125** are mounted to the plaster frame **130**.

The plaster frame **130** generally is a square, flat plate with upturned edges against which the housing **105** is flushly mounted. The plaster frame **130** also has a circular fixture aperture **145** sized for passing a lamp through its opening and to provide an illumination pathway. One of the edges of the plaster frame **130** may include holes (not shown) for mounting the junction box **135**. The junction box **135** is a metal box with insulated wiring terminals and knock-outs for connecting external wiring.

The mounting disc **140** is a circular disc with a cut-out area or opening of approximately the same diameter as the fixture aperture **145**. While the cut-out area generally is circular, the cut-out area has flat or straight portions on each side. The mounting disc **140** has screw holes for mounting the angle adjustment assembly **115**.

The angle adjustment assembly **115** includes two adjustment arms **150**, a lamp frame **155** having downwardly projecting arms **157**, one or more lens clips **160**, a lens holder **165**, and a lens **170**. The lower portion of the adjustment arms **150** have L-shaped ends with holes for mounting to the mounting disc **140**. The top portions of the adjustment arms **150** include an arc **173** that projects from

one side of the adjustment arm **150** and extends downward. Two elongated, arc-shaped slots **175** are located within the arc **173** of each of the adjustment arms **150**.

Referring also to FIGS. 1B, 1C, and 1E, the adjustment arms **150** are adjustably mounted to the downwardly projecting arms **157** by screws **176** and nylon spacers **177** that pass through the slots **175** and into screw holes **178** in the downwardly projecting arms. Referring to FIG. 1C, the spacers **177** form a space between the adjustment arms **150** and the downwardly projecting arms such that the screws **176** can be tightened while allowing the lamp frame **155** and downwardly projecting arms **157** to move relative to the adjustment arms **150**. Although the spacers are described as being made of nylon, any material that will form a space between the adjustment arms and the downwardly projecting arms can be used. For example, polytetrafluoroethylene, polyethylene, polypropylene, acetyl or other polymer or metal spacers may be used.

Referring also to FIG. 1D, a wing nut **181**, a washer **182**, and a screw **183** are positioned in one of the adjustment arms **150** at the bottom of the downwardly projecting arms **157**. Although FIG. 1D illustrates the wing nut **181**, the washer **182**, and the screw **183** as being positioned on only one arm **150**, a corresponding mechanism can be positioned on the other arm **150** and/or on both arms at the same time. Moreover, any fastening mechanism can be used to fix the position of the arms **150**. As illustrated in FIGS. 1A-1D, the downwardly projecting arms **157** are positioned on the inside of the adjustment arms **150**. Thus, the head of the wing nut **181** is accessible from the inside surface of the adjustment arm **150** and the head of the screw **183** is accessible from the outside surface of the adjustment arm **150**. In this manner, the wing nut **181** can be tightened and loosened from inside of the housing **105** without the housing being removed.

The lamp frame **155** generally is square with an octagonal lamp aperture **180** sized somewhat larger than an installed bulb and with the two downwardly projecting arms **157** connected to the adjustment arms **150**. The lamp frame **155**, which mounts to the rotation assembly **120**, also includes side brackets **184** for alignment of the rotation assembly **120** (FIG. 1A).

The rotation assembly **120** includes a rotation disc **185** and a rotation frame **190**. The rotation disc **185** is a circular disk with outside and inside perimeters. The rotation disc **185** is mountable to the rotation frame **190**, which also is a circular disk with an outside and an inside perimeter. The rotation frame **190** includes lamp clips **195** for installing a lamp (not shown). As described below, the rotation disc **185** and the rotation frame **190** are mounted to the lamp frame **155** and are used to provide an adjustable fixed orientation of a lamp relative to the light fixture **100**. As also described below, the orientation of the lamp is maintained even when a new lamp is installed.

Referring to FIG. 2A, the rotation frame **190** holds a lamp **210** with the lamp clips **195** extending around the lamp and being under tension. Thus, the lamp clips **195** must be bent outward under tension to remove the lamp, which can be accomplished by either directly bending the clips or pulling the lamp downward with enough force to overcome the tension imparted by the clips against the lamp. The lamp **210** is held in place between the inside perimeter of the rotation frame **190** and the lamp clips **195**. The rotation disc **185** also includes two hex head screws **215** threadably installed in the rotation disc for mounting the rotation frame **190** to the rotation disc.

Referring to FIG. 2B, in addition to the lamp clips **195**, the rotation frame **190** includes screw holes **220** and three series of three notches **225**. The screw holes have a narrow region **230** and a wide region **235**. The head of the hex head screw **215** is wider in diameter than the narrow region and narrower in diameter than the wide region **235**. The notches **225** align with three series of three protruding tabs (not shown) on the lamp **210** such that the lamp **210** can be installed in the rotation frame **190** in only one orientation.

Referring to FIG. 2C, the rotation disc **185** and the rotation frame **190** are assembled by aligning the hex head screws **215** with the wide regions **235** of the screw holes and moving them together in the direction shown by arrow A. Next, the rotation disc **185** and the rotation frame **190** are locked together by rotating the rotation frame **190** in the direction shown by arrow B. Finally, the screws **215** may be tightened down such that the heads of the screws **215** are tightened against the rotation frame **190** to fix the rotation frame to the rotation disc **185**. In this manner, the lamp **210** is fixed in the rotation frame **190** in one orientation and the rotation frame also is fixed against the rotation disc **185** in one orientation. As described below, the rotation disc **185**, the rotation frame **190**, and the lamp **210** are fixed against the lamp frame **155** in a desired orientation such that the orientation of the lamp relative to the lamp frame also is fixed, which is advantageous when the lamp is removed and a new lamp is reinstalled.

Referring to FIG. 3A, one or more mounting clips **310** are used to attach the rotation disc **185** to the lamp frame **155**. Referring to FIG. 3B, each mounting clip **310** includes a U-bracket **315** with a hole **320**, bracket pads **325**, and a screw **330**. The screw **330** has a head **335** that faces downward for access through the fixture aperture **145** shown in FIG. 1. The rotation disc **185**, typically with the rotation frame **190** and the lamp **210** attached, is placed on the lamp frame **155** and rotated until the desired orientation of the lamp is attained. The desired orientation is based on the lamp's lens and varies with the rotational orientation of the lamp. Thus, for a desired illumination effect, the lamp can be activated and rotated until the desired illumination is attained. The mounting clips **310** then are moved into a position such that the bracket pads **325** are placed against the lamp frame **155** and the rotation disc **185**, and the screws **330** are tightened. In this manner, the orientation of the lamp relative to the light fixture is set and the lamp can be easily removed and replaced without affecting the orientation.

Referring to FIG. 4A, the lens holder **165** (not shown) attaches to the lamp frame **155** by mounting the lens holder in the lens clips **160**. The lens clip **160** is a flexible metal strip with a bend **410** and a recessed area that forms a knee **415**. The bend **410** directs the lens clip **160** downward and the knee **415** provides an area to securely retain the lens holder **165** under tension between the lens clips **160**.

Referring to FIG. 4B, the lens holder **165** is shown with one end installed in the knee **415** of one of the lens clips **160**. The lens holder **165** is installed into the knee **415** by moving the lens holder **165** in the direction shown by arrow A while simultaneously pushing the lens holder in the direction of the first lens clip **160** to put the first lens clip under compression. Similarly, the lens holder **165** may be removed from the lens clips **160** by pulling the lens holder **165** out of the knees **415**.

Referring to FIG. 5A, one or more lens slots **510** are used to align the lens holder **165** when it is being installed in the knees **415** of the lens clips **160**. The lens slots **510** provide a fixed orientation of the lens holder **165** relative to the light

fixture **100** and prevent the lens holder from being rotated under the lamp. The lens holder **165** retains the lens **170** using retaining stops **515** and retaining clips **520**. The retaining stops **515** are raised portions on the lens holder that contact the lens **170** and help center the lens against the lens holder.

Referring to FIG. **5B**, each of the retaining clips **520**, which attach the lens holder **165** to the lens **170**, includes a U-shaped clip bracket **525** with a hole **530**, a clip screw **535** that passes through the hole **530**, and a pair of clip pads **540**. The lens **170** may have a ribbed side **545** and a flat side **550**, with the ribbed side **545** facing away or downward from the lens holder **165**. With the lamp positioned in a set position using the method described above and the lens holder **165** mounted in the lens clips **160**, the lens **170** can be rotated relative to the lens holder and the lamp until the desired illumination effect is attained. The U-shaped clip brackets **525** then are placed over the lens **170** and the lens holder **165** such that the pads **540** are in contact with the lens and the lens holder, and the clip screw **535** is tightened. In this manner, the lens **170** is in a fixed relationship with the lens holder **165**, which is in a fixed relationship with the light fixture **100**. Moreover, the lens **170** is in a fixed relationship with the lamp **210**. With these fixed relationships, the lens and the lens holder can be removed as a unit and the lamp can be removed and replaced without affecting the orientation of the lamp or the lens.

The recessed light fixture **100** can be installed in a plenum area of a ceiling. The hanger brackets **125** can be mounted to support structures in the plenum. In addition, the plaster frame **130** rests on the ceiling and may be affixed to the ceiling or its support members.

A lamp **210** can be installed in the recessed light fixture **100** from above or below the ceiling. The lamp **210** can be installed from below the ceiling through the aperture **145** in the plaster frame **130**. With the lens holder **165** and the lens **170** removed, the lamp is inserted through the aperture **145**, the protruding tabs on the lamp are aligned with the notches **225** on the rotation frame **190**, and the lamp is pushed into the lamp clips **195** to install the lamp. Next, the lens holder **165** is inserted through the aperture **145** and pushed into the lens clips **160** on the lamp frame **155** to install the lens holder **160**.

The lamp **210** can be installed from above the ceiling from the plenum area. First, the rotation frame **190** is removed from the light fixture **100** by loosening the hex head screws **215** that hold the rotation frame **190** to the rotation disc **185**. The rotation frame **190** then is rotated slightly to align the hex head screws **215** with the wide regions **235** of the screw holes **220** and the rotation frame **190** is lifted off of the rotation disc **185**. Next, the protruding tabs on the lamp are aligned with the notches **225** on the rotation frame **190** and the lamp is pushed into the lamp clips **195** to install the lamp in the rotation frame. Finally, the rotation frame **190** with the lamp is reinstalled in the light fixture **100**. The rotation frame **190** is positioned above the light fixture **100** and the wide regions **235** of the screw holes **220** in the rotation frame **190** are aligned with the hex head screws **215** on the rotation disc **185**. The rotation frame **190** is lowered onto the rotation disc **185** and the rotation frame **190** is rotated until the hex head screws are aligned with the narrow regions **230** of the screw holes **220**. The hex head screws **215** then are tightened to fix the rotation frame **190** and lamp to the light fixture **100**.

The angular orientation of the lamp **210** and the lens **170** also can be adjusted from inside the light fixture **100** (from below) or from outside the light fixture **100** (from the ceiling

plenum area). Adjustment of the orientation angle from the inside of the light fixture **100** is performed by loosening the wing nut **181**, adjusting the lamp frame **155** relative to the adjustment arms **150**, and retightening the wing nut. Adjustment of the orientation angle from the outside of the light fixture **100** is performed by loosening the screw **183**, adjusting the lamp frame **155** relative to the adjustment arms **150**, and retightening the screw **183**. After the orientation angle is set, the lamp **210** and the lens **170** may be removed or installed without disturbing the preset positions. Adjustment of the orientation angle may be performed with or without the lamp **210** and the lens **170** installed.

A number of implementation of the recessed light fixture **100** have been described. Other implementations are within the scope of the following claims.

What is claimed is:

1. A light fixture comprising:

a fixture assembly;

an angle adjustment assembly movably connected to the fixture assembly, the angle adjustment assembly configured to move rotationally relative to the fixture assembly; and

a rotation adjustment assembly movably connected to the angle adjustment assembly, the rotation adjustment assembly configured to move angularly relative to the angle adjustment assembly;

the angle adjustment assembly further configured to maintain a fixed angle between the rotation adjustment assembly and the fixture assembly;

the rotation adjustment assembly further configured to rotationally orient a lamp relative to the fixed angle and to maintain a fixed rotational orientation relative to the fixed angle;

whereby the rotation adjustment assembly maintains the fixed rotational orientation when the lamp is replaced with another lamp.

2. The light fixture of claim **1**, further comprising a lens mounting assembly comprising a lens and being removably mounted to the rotation adjustment assembly and configured to maintain a constant rotational orientation between a lamp mounted in the rotation adjustment assembly and the lens, such that the lens mounting assembly can be removed and reinstalled without affecting the constant rotational orientation between the lamp and the lens.

3. The light fixture of claim **2**, wherein the lens mounting assembly further comprises:

a lens holder configured to retain the lens and including a mounting member; and

at least one clip configured to mate with the mounting member to retain the lens holder on the rotation adjustment assembly.

4. The light fixture of claim **3**, wherein the at least one clip is mounted to the rotation adjustment assembly.

5. The light fixture of claim **3**, wherein the mounting member comprises a notch in the lens holder.

6. The light fixture of claim **3**, wherein the lens holder includes at least one lens clip configured to attach the lens to the lens holder to maintain the constant rotational orientation between the lamp and the lens.

7. The light fixture of claim **6**, wherein the lens has at least one ribbed surface and the lens mounting assembly maintains a constant rotational orientation between the ribbed surface of the lens and the lamp, such that the lens mounting assembly can be removed and reinstalled without affecting the constant rotational orientation between the ribbed surface of the lens and the lamp.

8. The light fixture of claim **1**, wherein the angle adjustment assembly comprises:

- a downwardly projecting arm connected to the rotation adjustment assembly;
- an arm extending from the fixture assembly, the downwardly projecting arm angularly connected to the arm extending from the fixture assembly; and
- a fastener configured to fix the angular position of the downwardly projecting arm relative to the arm extending from the fixture assembly.

9. The light fixture of claim **8**, wherein:

the fixture assembly comprises two arms extending from the fixture assembly, each arm including an arc portion having two slots; and

the angle adjustment assembly comprises two downwardly projecting arms, wherein each downwardly projecting arm includes two extending members that mate with the two slots of a respective arm extending from the fixture assembly such that when the downwardly projecting arm is moved relative to the arm extending from the fixture assembly, the extending members slidably move within the slots to adjust an angle of the arm extending from the fixture assembly relative to the downwardly projecting arm.

10. The light fixture of claim **8**, wherein the arm extending from the fixture assembly includes an arc portion having a slot and the downwardly projecting arm includes an extending member that mates with the slot, such that moving the downwardly projecting arm relative to the arm extending from the fixture assembly slidably moves the extending member within the slot to adjust an angle of the downwardly projecting arm relative to the arm extending from the fixture assembly.

11. The light fixture of claim **10**, wherein the fastener is further configured to fix the position of the downwardly extending arm relative to the arm extending from the fixture assembly.

12. The light fixture of claim **1**, wherein the rotation adjustment assembly comprises a lamp frame, a rotation disc configured to be rotatably oriented on the lamp frame, and a rotation frame configured to removably retain the lamp and to be mounted to the rotation disc.

13. The light fixture of claim **12**, further comprising at least one clip configured to maintain the rotation disc at a fixed rotational orientation relative to the lamp frame.

14. The light fixture of claim **12**, wherein the rotation frame includes an opening and the opening includes at least one set of notches configured to mate with protruding tabs on a lamp.

15. The light fixture of claim **12**, further comprising at least one screw configured to be threadably inserted into at least one threaded opening in the rotation disc, wherein the rotation frame includes at least one opening configured to receive at least a portion of the screw.

16. The light fixture of claim **15**, wherein:

each screw includes a first portion having a first screw diameter and a second portion having a second larger screw diameter;

each opening in the rotation frame includes a first portion having a first opening diameter and a second portion having a second, smaller opening diameter; and

the second screw diameter is smaller than the first opening diameter and larger than the second opening diameter, such that the screw is configured to retain the rotation frame to the rotation disc when the screw is positioned in the second portion.

17. The light fixture of claim **12**, further comprising at least two clips mounted to the rotation adjustment assembly and configured to removably retain a lamp to the rotation adjustment assembly.

18. The light fixture of claim **17**, wherein the clips are mounted to the rotation frame.

19. A method of relamping a light fixture comprising:

providing a light fixture including:

a fixture assembly;

an angle adjustment assembly movably connected to the fixture assembly, the angle adjustment assembly configured to move rotationally relative to the fixture assembly; and

a rotation adjustment assembly movably connected to the angle adjustment assembly, the rotation adjustment assembly configured to move angularly relative to the angle adjustment assembly;

the angle adjustment assembly further configured to maintain a fixed angle between the rotation adjustment assembly and the fixture assembly;

the rotation adjustment assembly further configured to rotationally orient a lamp relative to the fixed angle and to maintain a fixed rotational orientation relative to the fixed angle;

whereby the rotation adjustment assembly maintains the fixed rotational orientation when the lamp is replaced with another lamp;

removing the lamp from the rotation adjustment assembly; and

reinstalling another lamp in the rotation adjustment assembly.

20. The method of claim **19**, wherein:

providing a light fixture further comprises providing a rotation adjustment assembly having a lamp frame, a rotation disc configured to be rotatably oriented on the lamp frame, and a rotation frame configured to removably retain the lamp and to be removably mounted to the rotation disc;

removing the lamp further includes removing the rotation frame from the rotation disc and removing the lamp from the rotation frame; and

reinstalling another lamp further includes retaining another lamp on the rotation frame and mounting the rotation frame to the rotation disc.

21. The method of claim **19**, wherein:

removing the lamp includes removing the lamp from clips attaching the lamp to the rotation adjustment assembly; and

reinstalling another lamp further includes inserting another lamp into the clips attaching the lamp to the rotation adjustment assembly.

22. The method of claim **19**, wherein:

providing a light fixture further comprises providing a lens mounting assembly removably mounted to the rotation adjustment assembly;

removing the lamp further comprises removing the lens mounting assembly prior to removing the lamp; and

reinstalling another lamp further comprises reinstalling the lens mounting assembly after reinstalling the lamp.

23. The method of claim **19**, further comprising adjusting an angular orientation of the rotation adjustment assembly relative to the fixture assembly.

24. The method of claim **23**, wherein:

providing a light fixture further comprises providing an angle adjustment assembly having at least one down-

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wardly projecting arm connected to the rotation adjustment assembly, at least one arm extending from the fixture assembly, the at least one downwardly projecting arm angularly connected to the at least one arm extending from the fixture assembly, and a fastener 5 configured to fix the position of the downwardly projecting arm relative to the arm extending from the fixture assembly;

adjusting the angular orientation of the rotation adjustment assembly relative to the fixture assembly comprises: 10

moving the downwardly projecting arm relative to the arm extending from the fixture assembly to adjust an angle between the rotation adjustment assembly and the fixture assembly; and 15

fastening the fastener to maintain the angular orientation of the rotation adjustment assembly relative to the fixture assembly.

25. The method of claim **19**, further comprising adjusting a rotational orientation of the lamp relative to the rotation adjustment assembly. 20

26. The method of claim **25**, wherein:

providing a light fixture further comprises providing a rotation adjustment assembly having a lamp frame, a rotation disc configured to be rotatably oriented on the lamp frame, a rotation frame configured to removably 25

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retain the lamp and to be mounted to the rotation disc, and at least one clip configured to maintain the rotation disc at a fixed rotational orientation relative to the lamp frame; and

adjusting the rotational orientation of the lamp relative to the rotation adjustment assembly comprises:

retaining the lamp on the rotation frame;

mounting the rotation frame to the rotation disc;

orienting the rotation disc on the lamp frame;

rotating the rotation disc relative to the lamp frame until a desired rotational orientation is attained; and

attaching the at least one clip to the rotation disc to maintain the fixed rotational orientation of the rotation disc relative to the lamp frame.

27. The method of claim **26**, wherein:

providing a light fixture further comprises providing the lamp frame with an opening with a set of notches configured to mate with tabs on the lamp and at least two clips mounted to the rotation frame and configured to removably retain a lamp to the rotation frame; and

mounting the lamp to the rotation frame comprises inserting the lamp between the clips and mating the set of notches with the protruding tabs on the lamp.

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